

Ch 5 Polynomials

5-1 Monomials

-Expression that is a number, variable, or a product of a number and one or more variables

-No variables in denominator, no variables with negative exponents, no variables under radicals

Examples of Monomials

$$a^4$$

$$1$$

$$xy^3$$

Not Monomials

$$3x^2 + 2y$$

$$\frac{1}{x}$$

$$\sqrt{x}$$

Exponent Laws/Rules/Properties

Negative Exponent

$$a^{-n} = \frac{1}{a^n} \text{ and } \frac{1}{a^{-n}} = a^n$$

Quotient of Powers

$$\frac{a^m}{a^n} = a^{m-n}$$

Product of Powers

$$a^m \cdot a^n = a^{m+n}$$

$$x^3 \cdot x^2 = x^5$$

Properties of Powers

For a, b real numbers and m, n integers:

$$(a^m)^n = a^{mn}$$

$$(ab)^m = a^m b^m$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0$$

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n \text{ or } \frac{b^n}{a^n}, a \neq 0, b \neq 0$$

$$a^0 = 1$$

$$\frac{x^3}{x^3} = x^{3-3} = x^0 = 1$$

Degree-Sum of exponents of a monomial

(Variables Only)

Ex: $3x^2$ $\frac{1}{2}x^3$ -5 $-8z^5$ $5xy^3$

Degree: 2 3 0 5 4

"Powers of 10"

<http://www.youtube.com/watch?v=BBsOeLcUARw>

$$1. c^{12} \cdot c^{-4} \cdot c^6$$

$$c^{14}$$

$$2. \frac{b^8}{b^2} = b^6$$

$$3. (a^4)^5$$

$$a^{20}$$

$$4. \frac{x^{-2}y^1}{x^4y^{-1}}$$

$$x^{-6}y^2 = \frac{y^2}{x^6}$$

$$5. \left(\frac{a^2b}{a^{-3}b^2} \right)^{-1}$$

$$\left(\frac{a^5}{b} \right)^{-1}$$

$$\frac{b}{a^5}$$

$$6. \left(\frac{x^2y}{xy^3} \right)^2$$

$$\frac{x^2}{y^4}$$

$$12. \frac{2mn^2(3m^2n)^2}{12m^3n^4}$$

Scientific notation | A number expressed in the form $a \times 10^n$, where $1 \leq a < 10$ and n is an integer

1. 24,300

2.43×10^4

2. 0.00099

9.9×10^{-4}

4. 525,000,000

5.25×10^8

5. 0.0000038

3.8×10^{-6}

10. $(3.6 \times 10^4)(5 \times 10^3)$

18×10^7

1.8×10^8

13. $\frac{9.5 \times 10^7}{3.8 \times 10^{-2}}$

2.5×10^9

~~$(x+y)^2$~~

16. $(3.2 \times 10^{-3})^2$

$3.2^2 \times 10^{-6}$

10.24×10^{-6}

1.024×10^{-5}

5-2

Polynomials

Polynomial | a monomial or a sum of monomials

1. $(6x^2 - 3x + 2) - (4x^2 + x - 3)$

$6x^2 - 3x + 2 - 4x^2 - x + 3$

$2x^2 - 4x + 5$

3. $(-4m^2 - 6m) - (6m + 4m^2)$

$-8m^2 - 12m$

5. $(18p^2 + 11pq - 6q^2) - (15p^2 - 3pq + 4q^2)$

$3p^2 + 14pq - 10q^2$

Multiplying Polynomials

FOIL Pattern	To multiply two binomials, add the products of F the <i>first</i> terms, O the <i>outer</i> terms, I the <i>inner</i> terms, and L the <i>last</i> terms.
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$$3(-5y^2)(y^2 + 2y - 3)$$

$$-5y^4 - 10y^3 + 15y^2$$

$$(3x^2)^3$$

$$5. (5 - 4x)(3 - 2x)$$

$$15 - 10x - 12x + 8x^2$$

$$15 - 22x + 8x^2$$

$$8x^2 - 22x + 15$$

$$6. (2x - 1)(3x + 5)$$

$$6x^2 + 7x - 5$$

13. $(3t^2 - 8)(t^2 + 5)$

$$3t^4 + 15t^2 - 8t^2 - 40$$

$$3t^4 + 7t^2 - 40$$

14. $(2r + 7)^2$

$$(2r + 7)(2r + 7)$$

$$4r^2 + 28r + 49$$

20. $(2n^2 - 3)(n^2 + 5n - 1)$

$$2n^2(n^2 + 5n - 1) - 3(n^2 + 5n - 1)$$

$$2n^4 + 10n^3 - 2n^2 - 3n^2 - 15n + 3$$

$$2n^4 + 10n^3 - 5n^2 - 15n + 3$$

$$x^3: \quad \underbrace{a^3 b^3 c}_{9} + \underbrace{3x^4}_{4} - 9$$

Special Cases

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a-b)(a-b)$$

$$(a + b)(a - b)$$

$$= a^2 - b^2$$

Homework

p. 226-227 19-35odd, 41-43, 47-52

p. 231-232 16-21, 24, 27, 32, 37, 41, 47, 50